"Note on the Cause of the Period of Chemical Induction in the Union of Hydrogen and Chlorine." By D. L. CHAPMAN and C. H. BURGESS, Demonstrators in Chemistry in the University of Manchester. Communicated by Professor H. B. DIXON, F.R.S. Received January 14,—Read January 26, 1905.

The induction period, which, in certain circumstances, is observed when a mixture of hydrogen and chlorine is exposed to light, has been commonly attributed to the preliminary formation of an unstable intermediate compound. The authors have for some time held that this view does not accord with the observed facts. This contention is confirmed by recent experiments, which have established that the phenomenon in question is due to the presence in the gas (or in the aqueous solution in contact with it) of substances capable of reacting with chlorine.

At an early stage in the investigation it was proved that the retardation of chemical action did not depend on any condition of the hydrogen, thus making it only necessary to consider the condition of the chlorine itself and of the other substances immediately in contact with it.

Water, and particularly solutions of salts in water, possess the power of rendering active chlorine inactive towards hydrogen. On long contact with chlorine in the presence of light, or on boiling with chlorine, these solutions lose this property even after subsequent removal of the chlorine by exhaustion. Numerous experiments have recently been made in order to find out if these solutions recover their power of rendering chlorine inactive, and it has been found that the only method of effecting this is by the introduction of substances which react with chlorine. Of the compounds investigated the most efficient to use for this purpose is ammonia, minute traces of which are capable of preventing the action between hydrogen and chlorine for a period of time many times longer than had been previously observed. Sulphur dioxide acts in the same sense as ammonia, but it is more easily removed on exposure to light.

It has been hitherto supposed that an active mixture of hydrogen and chlorine, after standing in the dark for several hours, returned to its original inactive condition. If this were really the case it would be an objection to the view that the induction period is due to the presence of impurities. By the employment of a quartz actinometer we have, however, succeeded in showing that no decay of activity takes place; and, after keeping the mixture for days in the dark, the gases immediately combine on exposure to light—without any period of gradual acceleration.